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DXXI.—SHEEP-BUSHES AND SALT-BUSHES.

In the warmer and drier parts of the world lands devoted to pastoral industries are not always clothed with the grassy vegetation familiar in temperate countries. Its place is taken by dwarf shrubs and herbaceous plants other than grasses, but which are no less valuable. The experience gained in South Africa and Australia admits of practical application in other parts of the world, especially where, as will be seen, the soil is intolerant of any other kind of vegetation.

The following information has been put together to meet the demands of correspondents. As long ago as 1869, Kew took steps to bring the subject under the notice of the colonies. (See *Kew Report*, 1882, pp. 21, 22.)

SHEEP-BUSHES.

In Museum No. III. of the Royal Gardens, a large case contains a series of plants belonging to various natural orders, illustrating the vegetation of the Karroo region of South Africa.

The most important of these as a fodder plant is *Pentzia virgata*, belonging to the great order of *Compositæ*, and a near ally of our common Tansy (*Tanacetum vulgare*) and Wormwood (*Artemisia*).

Professor MacOwan writing to Mr. J. F. Duthie, Superintendent of the Government Botanical Gardens, Saharanpur, in 1884, gave the following account of the Cape sheep-bush:—

“*Pentzia virgata*, Less., the ‘Goed-Karroo Bosje’ covers large areas of the Karroo Veldt in the centre of Cape Colony. It is a dwarf tufted composite, with discoid heads rising a few inches above the cushion-like mass of twigs and foliage. The general colour is a dull, glaucous green. The side branches come out, arcuately bend over, touch the ground, and in the wet season, root at the tips. It is just this peculiarity which renders the plant so valuable, for as our farmers overstock the farms with sheep, and do not even keep the stock off certain parts for recovery in their turn, the veldt is cut up into innumerable sheep tracks, each of which becomes a swift running waterway in the rainy season. Thus a badly-managed farm presents a curious hummocky appearance, as if the bushes were each perched on a little eminence with bare soil around. The *Pentzia*, if only the stock be kept off, corrects this very soon. The arcuate branches touch the curved hollow of the

track, root there, and collect a quantity of water-borne debris to which each rain adds, until a new hummock arises right in the centre of the water-run. Obviously this process ends in the renovations of the veldt and turning the water out of channels on to the level.

"If you have soil of the deep, fertile, lacustrine loam of our Karroo, you might grow *Pentzia*. But it is not a plant for barren sand." [*Report on the Government Botanical Gardens at Saharanpur and Mussoorie*, 1884, p. 9.]

The *Report of the Royal Gardens, Kew*, for the year 1873, p. 5, states that the "*Sheep-bush* of the Cape of Good Hope" was successfully introduced to South Australia by seed sent from Kew in 1869. Dr. Schomburgk, Director of the Botanic Garden, Adelaide, remarked: "I raised about 20 plants, which have done remarkably well, and prove that our climate is well adapted for their growth. . . . The leaves and branches contain an aromatic bitterness which, I understand, is liked very much by sheep, and which gives the mutton a fine peculiar flavour. The plant is easily propagated from cuttings of which every one will grow if planted when the first rains begin to fall."

In his report for 1883 (p. 5) Mr. Duthie wrote:—

"The sheep-bush of South Africa has been tried in Australia for several years and is highly spoken of as a fodder plant. Seeds were received at the Saharanpur Garden from Dr. Schomburgk."

The attempt to establish it on the saline or *usar* lands in North-western India, was, however, unsuccessful. After repeated efforts Mr. Duthie reported in 1887 "it is needless to make further attempts to cultivate the sheep-bush in this part of India."

The following later information is taken from the *Agricultural Journal*, Cape Colony, of December 3, 1891:—

"Mr. E. G. Alston, of Van Wyks Vley, has kindly responded to our request and sent a small quantity of the seed of the *Schaap Bosch* which will be sent to Australia. For Cape farmers it would be preferable to get rooted layers for planting which Mr. Alston is also prepared to provide.

"This plant, as Prof. MacOwan pointed out some years ago, makes natural layers in the loose gravel of the sheep-tracks worn between the bushes; it roots, and collects soil by damming up the channel, thus turning the water out on the level.

Mr. Alston says at the end of his communication:—"Our intelligent farmers begin to see the necessity of providing bushes and grass in the place of those that fail to stand the close cropping by sheep and the evils attendant on a heavily stocked sheep walk. The time is within measurable distance when in these northern districts we shall have of set purpose to grow stock-food bushes on our farms, or else leave large tracts for years to recover themselves. To allow parts of a farm to lie fallow means loss, and with our periodical droughts I wonder how long we could resist the temptation to put starving sheep upon reserved and forbidden ground."

SALT-BUSHES.

In many parts of the world the soil is impregnated with alkaline salts, especially of soda, to a degree which is insupportable to most kinds of vegetation. Happily, one family of plants, the Goosefoots (*Chenopodiaceæ*), is an exception.

They are tolerant of soda salts, and many species occur plentifully in consequence in maritime situations in temperate countries. In the

preface to his *Iconography of Australian Salsolaceous Plants* Sir Ferdinand von Mueller writes:—

"The 'salt-bushes' constitute in many wide tracts of our island-continent the prevailing vegetation, and on this depends locally to a large extent the sustenance of herds and flocks. Moreover, this kind of pasture nutriment has proved so particularly wholesome, that 'salt-bush' country has become among Australian ruralists quite famous, . . . more particularly as (salt-bushes) will live even through the direst periodic droughts."

He adds:—"That under such circumstances these important plants may finally succumb through continuous depasturing, cannot be surprising; thus, the necessity is forced on the proprietors or holders of 'runs' to renew the salt-bush vegetation by methodical sowings."

Sir Ferdinand Mueller wrote June 2, 1894:—"The frosts to which in the dry interior of Australia the best shrubby species of *Atriplex* are exposed are not severe. They may, however, survive, perhaps, rather hard frosts, and spring from the root again. For testing this we have no ready means in this mostly winterless clime. I should think that the shrubby Australian species of *Atriplex* will prove to have a similar constitution to *A. Halimus*, which seems to grow naturally not far north of the Mediterranean."

Australia possesses about 112 species of *Chenopodiaceæ* belonging to 15 genera of which eight are peculiar to it. Of these *Rhagodia*, *Chenopodium*, *Atriplex*, *Enchylæna*, *Kochia*, *Chenolea*, and *Sclerolæna*, furnish salt-bushes available for pasture. For a detailed account of them reference may be made to Sir Ferdinand Mueller "Iconography" (1889-92) already mentioned, to the same writer's "Select Extra-tropical Plants," ninth edition (1895), and to the excellent monograph on "The Forage Plants of Australia" by F. Turner, F.L.S. (1891) published by the Department of Agriculture, New South Wales, in which Mr. Turner holds the position of botanist.

Only a few of the Australian species which are likely to prove useful in other countries will be discussed in this article.

Their value is clearly pointed by Mr. Turner (p. xviii.). "Once the salt-bush plants are established they will continue to grow under the most adverse circumstances of drought and great heat. In fact, very few other kinds of plants so useful for fodder purposes could exist under such adverse circumstances as do most kinds of the salt-bush family. There is abundant proof that when sheep are depastured in a country where plenty of salinous plants are growing among the natural grasses, fluke and other allied ailments are almost unknown. It has been also said that horses which are subject to swamp cancer on the low coast lands, when turned into pasture where salinous plants are plentiful, soon lose this disease."

The present position of "salt-bush" plants in Australia is, however, not satisfactory. Mr. Turner states (*ibid.*):—"These most valuable plants are from year to year becoming scarcer on the central plains of this continent. Being so closely fed down they get little chance to mature seed, which is their only natural means of reproduction. When left unmolested for a time, however, they will produce an abundance of seed which germinates readily under ordinary conditions. Many of them also are readily increased by cuttings, so that it would require no great outlay to enter upon a proper system of conservation or even cultivation."

And further (p. 66):—"If nothing is done to perpetuate these valuable pasture plants, Australian wool will depreciate; for it is solely

on account of our superior indigenous forage plants and grasses that our wools take such a high place in the market."

Of all the Australian salt-bushes, *Atriplex nummularia*, Lindl., is, perhaps, the one which has attracted most attention.

Turner (p. 57) gives the following account of it: "*A. nummularia*, Lindl., is a shrub which attains a height of from 6 to 10 feet, and is covered all over with a scaly tomentum. The leaves are variable but are mostly orbicular, rather thick and slightly sinuate-toothed. The plant is dioecious, that is the two sexes of the flowers are borne on separate individuals. It is peculiar to the Macquarie, Castlereagh and Darling rivers, and the arid western plains in New South Wales, Darling Downs in Queensland, Murray Scrub in Victoria, and the interior of South Australia. At one time it was moderately plentiful, but the overstocking of the runs has had a most serious effect on the plant, and in some places it is nearly exterminated. Cattle, sheep and other herbivora are so extremely fond of it, and crop it down so closely, that it has little chance to recover, much less produce seed in sufficient quantities for its natural perpetuation. Its drought-enduring qualities are remarkable, for it stands the hot winds on our arid central plains throughout the summer months with little check upon its growth. Such a valuable fodder plant is well worthy of extensive conservation and culture, and if this be not done within a very few years, it will then be practically impossible, except under very careful management. When not too closely fed over, the plant will seed in abundance, and the seed germinates readily under ordinary conditions. It will also strike readily from cuttings put down in the common way. Hence no great outlay will be required for a proper conservation, if it be taken in time. The woody part of the plant amounts to 10 per cent only; the other 90 per cent. is food and moisture."

An analysis of the dry plant ash, which amounts to 31.28 per cent., shows the amount of alkali and other salts it contains, and which add very greatly to its value as a change-food for sheep affected with parasites.

Potash	-	-	4.91	The plant itself contains—	
Soda	-	-	9.25	Carbohydrates	42.85
Common Salt	-	-	9.47	Oily matter	2.18
Lime	-	-	2.71	Albuminoids	16.45
Magnesia	-	-	2.12	Woody fibre	7.24
Iron oxide	-	-	0.20	Ash as carbonates	31.28
Sulph. oxide	-	-	0.99		
Phosph. oxide	-	-	1.28		100.00
Silica	-	-	0.35		
			<hr/> 31.28		

There are large tracts of land in India and especially in the north-west provinces and the Punjab where efflorescent salts are so abundant that the land is rendered more or less sterile. The term *reh*, is the general vernacular name in India for efflorescent salts. In the Upper Punjab the efflorescence is known as *Kallar*, and in Oudh and other parts of India the affected lands are called *usar*. (The *usar* grass is *Sporobolus arabicus*, Boiss.) Large sums of money have been spent in providing canals for irrigation purposes and in the endeavour to make *usar* lands productive. It has been proved that irrigation by canal water, when not accompanied by deep drainage, has had the remarkable effect of increasing the amount of *reh* deposits in the soil

and in consequence large tracts have been thrown out of cultivation. This has been done by raising the level of the sub-soil saline waters and so bringing them into injurious contiguity with the superficial layers of soil. Thus is explained the apparently paradoxical fact that irrigation, by comparatively pure canal water, has been followed by an increase of salts in the superficial soils.

Efforts were made about the year 1880 to introduce the "salt-bush" plants of Australia for experimental cultivation on the *usar* lands. Seeds in the first instance were received at the Saharunpur gardens from the Melbourne Botanical Gardens. In his *Report* for the year ending 31st March 1882, p. 9, Mr. J. F. Duthie, F.L.S., wrote "The Australian salt-bushes and their allies have been only very lately sown but the progress they have made is so far in their favour. There are several plants of *A. halimoides*, *nummularia*, and of two other species thriving very well." In 1883 "the small plantation of salt-bush plants continued to thrive. The plants were four to six feet high." It was suggested that as the salt-bush is essentially a desert plant it should not be permanently transplanted until after the rainy season is over; "this injunction applies more particularly to those parts of north-west India where the rains continue for any length of time. As soon as the plants had had sufficient time to establish themselves no amount of rain is likely to injure them."

Experiments with salt-bush were also carried on by the Director of the Department of Agriculture and Commerce of the North-western Provinces and Oudh. The plants were put out on *usar* soils, and the reports upon the early experiments were encouraging. In Appendix II. to the *Report* of the Department for the year 1883, Mr. W. J. Wilson stated that plants of *Atriplex nummularia* and other species were received from the Saharunpur Gardens in July 1882, and again in July 1883. "Of these plants," he says, "*A. nummularia* promises to be the most valuable as it has an abundant leaf growth and should yield a large supply of fodder." In 1884 the plants were thriving. In 1885 Mr. Wilson reported "that the Australian salt-bush . . . gave promise even in bad *usar*." In 1886 the Awa *usar* plantation was handed over to the Rajah of Awa, and the further experiments were transferred to the *usar* land near Cawnpore and Aligarh. In Appendix C. to the *Report* of the Department for the year 1889, p. 9, the following note is made by the Director of the Botanical Department on the result of his inspection of the Aligarh plantation:—"The salt-bush (*Atriplex nummularia*) promises to be a success as far as the soil is concerned, the most healthy specimens being those which were planted in soil strongly infected with *reh* salts; but being essentially a desert species the excessive damp to which it is exposed in the Doab during the hot rainy months is prejudicial to its nature. At this season also it is liable to attacks of innumerable caterpillars, which devour the leaves and weaken the plants." This is the latest information given by the Department of Agriculture of the North-western Provinces and Oudh.

The experiments carried on concurrently with the above at the Saharunpur Gardens are detailed below:—

"Salt-bush (*Atriplex nummularia*).—The plantation of this fodder plant continues to exist in a healthy state. The seeds produced last year by the plants in the plantation proved to be the soundest lot we have as yet obtained from them. Formerly the seeds collected from these plants germinated very sparingly, but this season nearly every seed came up, with the result of a stock of 3,500 young plants. These

have all been bespoken by the Director of the Botanical Department, Northern India, for planting out next autumn in the *usar* reserves. The whole stock is therefore being retained for that purpose." (*Report* for 1888, p. 11.)

"The large stock of young plants made mention of in the last report was taken over by the Director of the Botanical Department, and were planted under his direction in the *usar* reserves of the Aligarh and Cawnpore districts. Another large batch is now under propagation for disposal in the same manner during the current season." (*Report* for 1889, p. 10.)

The last official note on the Salt-bush at Saharunpur is contained in the following extract from the *Report* of the Garden for the year ending 31st March 1890 (pp. 11-12) :—

"A few plants of this fodder were planted out last rains to take the place of some which had died. A considerable number of plants remain on hand for distribution, but there was no call for them during the year. The Director of the Botanical Department, Northern India, having now been supplied with as many plants as he cares to try in the Aligarh and Cawnpore *usar* reserves, there is little probability of any extensive demand springing up until something definite has resulted from his experiments. For the present, we will therefore discontinue propagation, but keep up a small stock plantation in case the Aligarh and Cawnpore experiments should turn out to be sufficiently encouraging for trying this plant on a larger scale at some future period."

The following detailed information respecting the introduction of the Australian-salt bushes into Cape Colony and the success which has been obtained with them is taken from the *Agricultural Journal of Cape Colony* for the 18th May 1893 :—

(*Atriplex nummularia*, Lindl. and *A. halimoides*, Lindl.).—The following interesting report by Mr. E. Garwood Alston, of Van Wyk's Vley Estate, giving an account of his success in acclimatising the plant and distributing the seed of the Australian salt-bush, which has proved of such immense value as fodder plant in this colony, is published for general information :—

In April 1886, a year or two after my father had commenced the evolution of an agricultural centre from a dam and a desert stretch of Karoo, Professor MacOwan, our kind and constant adviser in botanical matters, sent us six seeds of *Atriplex halimoides*, Lindl., one of the Australian salt-bushes, for trial here. Only two came up; one died before reaching maturity, and the other represents the mother plant of all the *A. halimoides* found in this country.

Later on a second packet of *A. halimoides*, Lindl., and *A. nummularia* Lindl., was sent by Professor MacOwan (they had been obtained from Sir Ferd. v. Mueller, the Government Botanist of Victoria), but as we had established the first-named, only *A. nummularia* was sown, with the result that in a year's time we were in possession of a patch large enough to supply seeds in fair quantities to farmers and others.

All the seeds were sown from half-an-inch to an inch deep in brackish clay soil, and after the plant once commenced to mature its seed, it propagated itself rapidly enough to enable us to keep up the supply in spite of heavy demands every year.

I should not like to say that, as a fodder plant, the Australian species are better than our own *Atriplex Halimus*, but the popular idea locally is that the Australian species is less salt, and more can be eaten by cattle and sheep.

Our own preference for the stranger is caused by the larger quantity of food produced in a given time, its capability for seeding profusely for nine months out of the twelve, and the ease with which it can be raised. At Van Wyk's Vley the following animals feed on it in preference to our native *Atriplex* :—Cattle, horses, donkeys, sheep, goats, pigs, fowls, and even ants ! It is just possible that the reason may lie in the ability of *A. Halimus* to absorb more saline matter from the soil than its cousins, and if so it is *primâ facie* an argument in favour of the Cape plant being sown in preference to the Australian, where there is but little salt in the soil.

The drawback to the Cape variety is the small number of fertile seeds it yields yearly, and its failure to find out the defensive habit its cousins have acquired to keep the soil cool and moist for the seedlings by dropping over them a heavy mulching of withered leaves and seed. Apparently *A. Halimus* is more particular in the choice of soil than those now acclimatised, but on this point I should like more information.

During drought I have known cattle, horses, and sheep to browse and thrive upon these Australian fodder-plants, a most decided preference being given to them, although the surrounding ground was covered with other species of salt bushes.

In September 1889, I left for Parijs, in the Orange Free State, and took some of the seed with me. Each farmer on the route, *viâ* Hope Town, Kimberley, Boshof, Bultfontein, Kroonstadt, Vredefort and Parijs, received a small quantity to try ; parcels were also sent to the Government Secretaries of the Orange Free State and the Transvaal, and various editors of newspapers.

The result was gratifying, for in a few months my father wrote to say that he had received quite a shoal of applications from the various districts I had passed through.

Up to this time we had been supplying seeds by post, 1s. per pound which included cost of collection, bag and postage : at 3s. 6d. per grain bag (say 20lbs.) 23s. 3d. per woolpack (say 150lbs.), and the same price obtains now.

The Agricultural Department was supplied with quantities as required, and I believe many farmers drew from that source, while others were referred to us for larger parcels. The publication of a letter I wrote to the Department in the *Agricultural Journal* led to an immediate increase in the demand. I am pleased to say that His Honour President Reitz of the Orange Free State interested himself and his Government in distributing the seed to such an extent that I had the pleasure of forwarding four woolpacks full to his government between January 1892 and January 1893. On inquiry I am informed by the Government Secretary that the seeds grew well, but that the locusts had done a great deal of damage during the past season (presumably to the *young* plants).

Mons. Geoff. St. Hilaire, Directeur du Jardin Zoologique d'Acclimation, Paris, also applied for a supply of *A. Halimus*, which he proposed to acclimatise in the southern portion of Algiers. We sent him the three kinds ; it would be very interesting to know the result.

Seeds were also supplied to Mr. Hermann, manager of a large company at Bethany, German South West Africa, who was quietly engaged in stocking that part of the country with merino sheep from our district, in order to provide an article of export. Mr. Steyn, residing at Bloemfontein on the western edge of the Kalahari Desert, has

taken a fair quantity for trial there, and I hope soon to hear the result.

EDWARD G. ALSTON.

24th March 1893.

Memoranda.

Number of seeds.—The number of seeds to a pound when dry is about 25,800 gross and 20,000 net (matured).

Time to sow.—*Class of soil.*—The seed may be sown at any time during the spring, summer and autumn months; is not over particular as to class of soil, but prefers and grows most luxuriantly on moist brackish patches.

Mode of sowing. (a) *In the veld.*—To sow the seed broadcast in the veld is very wasteful and unsatisfactory; the use of a spade or light hoe to lift the soil slightly, and inverting a thorny bush over the spot after sowing, is trouble well repaid. (b) *On old lands.*—When the object in view is to make use of old and worthless lands, they should be ploughed but not harrowed. The seed sown in small patches (say 50 yards apart), from half-an-inch to an inch deep, and well protected against sheep and cattle till the stem of the plant is too hard for them to eat. A light mulching of straw or similar material prevents too rapid evaporation, and in clay soils the pinching of the tender stem of the seedling. A fungus, I am told by Professor MacOwan, is likely to be the cause of a seedling dying sometimes. The spread of the bush on tilled ground is rapid; hence the advice to sow small patches, a foresight which enables the farmer to look after it better and use less seed and water.

Drought and frost.—The plant stands drought and a minimum temperature of 14° as well as the Cape *Atriplex*.

Names.—It is an absolute necessity that the Australian salt-bush should be called by its proper name *Atriplex nummularia*, to prevent confusion if other salt-bushes are imported from Australia.

If an Australian were to apply here for seeds of a Cape salt-bush (meaning *A. Halimus*), he might receive "Aschbosch," "Inkbosch," "Zout Ganna," and possibly various kinds of "Kauwgoed."

EDWARD G. ALSTON.

Van Wyk's Vley.

Carnarvon, March 24, 1893.

Professor MacOwan writes in the *Agricultural Journal of Cape Colony* for May 18th, 1893 (p. 180):—

"It is impossible to close this brief note without calling the attention of Cape agriculturists to the fact that they owe this magnificent addition to the food resources of their driest districts, ultimately, to the wise provision and generous care of Sir Ferdinand von Mueller, the Government Botanist of Victoria, who sent the seeds over here, and repeatedly pressed it upon our attention in the most earnest manner. Long since we owed to him the Eucalyptus gum trees, springing up by thousands where formerly trees were not. Now we are a second time indebted to him for a fodder plant, which is making its way as fast as did the ubiquitous blue-gum. I hope that in remembering Mr. Alston, as he richly deserves, we shall never forget Sir Ferdinand von Mueller."

South Africa itself, as will have been seen, is not destitute of native salt-bushes. One of these, *Atriplex Halimus*, L., reaches the South of Europe, and is cultivated in the Kew Arboretum. It is not unfrequently cultivated as a hedge plant in this country in the Isle of Wight, and elsewhere near the sea.

In the Report of the Cape Town Botanic Gardens for 1886, Professor MacOwan writes :—

“Perhaps the most noteworthy of the sale returns are the seeds of the salt-bushes, so prized by sheep farmers in Australia. These have attracted much notice among some of our colonists, and have been repeatedly asked for both through this garden, and directly from Government. We have, however, as I have reported to the Commissioner of Crown Lands, abundance of similar native plants of equal value, already well known to farmers, and capable of indefinite encouragement on brak land. Of these, *Atriplex Halimus*, L., the ‘Vaal-Bosje,’ is, perhaps, the best. *Kochia pubescens* and *K. salsoloides* are doubtless as good fodder, but their seeds are not conspicuous like those of the ‘Vaal-Bosje,’ and would be difficult to collect. I have recorded an instance of the ‘Vaal-Bosje’ being multiplied on otherwise useless brak land by the simple process of scattering the seed on the occurrence of rain, and driving sheep over the surface to tread it in.”

With regard to the relative merits as fodder plants of the Australian salt-bush (*Atriplex nummularia*) and the Cape salt-bush (*Atriplex Halimus*) the following analysis is published in the *Agricultural Journal of Cape Colony* :—In the last issue (Vol. VI. page 180), Professor MacOwan offers some remarks on an analysis of the Australian salt-bush (*Atriplex nummularia*). A comparison of the results there mentioned with those of an analysis of the Cape salt-bush (*Atriplex Halimus*) performed by us some time ago may possibly be of interest.

		Australian.		Cape.
Carbohydrates	- - -	42.85	-	63.37
Oily matter	- - -	2.18	-	—
Albuminoids	- - -	16.45	-	4.78
Woody Fibre	- - -	7.24	-	7.98
Ash	- - -	31.28	-	23.87

It will be observed that according to above results, the carbohydrates which constitute the fat-forming material *par excellence* in plants are more abundant in the Cape plant. The Australian salt-bush on the other hand contains a good deal more albuminoid, *i.e.*, nitrogenous or strength giving constituents.

CHAS. F. JURITZ, Senior Analyst.

A few other Australian salt-bushes belonging to the genus *Atriplex* may be briefly described :—

Atriplex halimoides, Lindl. A procumbent or diffuse under-shrub. Queensland to South Australia and gregarious over the greater part of the saline desert interior of Australia. Mueller describes it as “one of the best dwarf species for salt-bush pastures.” Raised readily from seed. Cultivated at Kew.

Atriplex leptocarpa, F. V. Muell. A strong plant with a thick stock and herbaceous procumbent stems extending to 1 to 2 feet. The whole plant is more or less hoary or white with a scaly tomentum. East Australia. Mueller states :—Another of the perennial salt-bushes which render many dry and sterile tracts valuable for sheep pastures. It will

bear a great amount of drought, and if not too closely fed down produces seed in abundance." Seeds of this were distributed from Kew in May 1895.

Atriplex semibaccata, R. Br. Stems herbaceous, procumbent or prostrate, spreading to 1 or 2 feet. Queensland to West Australia. Mueller says:—"Very much liked by sheep, and considered among the best of saline herbage of the salt-bush country. Mr. Farrer pronounces this herb to be wonderful for its productiveness and its drought-resisting power."

This plant has proved most valuable in some of "the worst alkali spots" in California, single plants having reached a diameter of 16 feet in one season. "The yield of a full crop is about 20 tons of green material, or calculating on a basis of 75 per cent. water, 5 tons of dry matter per acre. A good season would permit of two such crops."

A further note (*Report of Agricultural Experiment Stations, 1894-95*, p. 320) states:—"It seems to be already demonstrated that this Australian species of *Atriplex* will constitute itself a most important industrial factor in this State, and will render productive vast tracts of land which are at present a blot on the landscape. . . . These tracts can be covered with salt-bush, and the resulting forage will aid greatly in maintaining domestic animals." The following chemical investigation of the fresh plant as grown in California has been made by Mr. M. E. Jaffa:—

Proximate analysis of the Australian salt-bush (*Atriplex semibaccata*) compared with some green fodders:—

—	Salt-bush.	Alfalfa.	Flat pea.*	Oat fodder.
Water - - -	78.03	74.95	63.48	62.20
Organic matter - -	17.39	23.38	33.34	35.30
Mineral matter (ash) -	4.58	1.67	3.18	2.50
Totals - - -	100.00	100.00	100.00	100.00

The following further account is taken from a Bulletin issued by the Agricultural Experimental Station of the University of California issued in November last.

"*Atriplex semibaccata*.—The past year's experience with this plant, both on the University station ground at Tulare and on the lands of scores of those furnished with seed or plants, shows that this plant has peerless adaptation for growth on soils too alkaline to support any other useful growth. So strongly are owners of alkali lands impressed with this fact that thousands of acres will be sown this winter. Enthusiastic correspondents write that the trial and announcement of the suitability of this plant are worth more to California than all the money the University Experiment Stations have cost from their beginning. The introduction of the plant to owners of waste alkali lands is certainly one of the most striking achievements in the University's long-continued policy of trial and distribution of economic plants. Bulletin No. 105, which will be mailed to all applicants, gives observations of the growth of the plant, hints for its culture, and investigations into its food value. Small plants set in alkali spots have attained a thick, matted growth,

**Lathyrus sylvestris*.

16 feet in diameter in a single season. The crop, calculated on the basis of weighing the cut from a small area, should reach 20 tons of green feed, or 5 tons of dry from an acre, and probably two such cuts can be made each season. Three parts of this forage, mixed with one part of common hay, is readily eaten by horses and cattle. Sheep and hogs eat the green plant freely. The plant should be tried on alkali soils everywhere, in order that its climatic and other adaptations may be definitely determined. Plants may be grown by sowing the seed in boxes or garden beds, covering very lightly, and planting out the seedlings several feet apart, when a few inches high, on alkali spots. This is the surest way to get the plant established, although if the seed be scattered on the surface of the alkali soil before a rain, it germinates readily when the heat is adequate. When the plant once gets a hold on the soil, it covers the ground very thickly from self-sown seeds, which are produced in abundance. Seeds are sent at 5 cents per packet, post paid."

Professor MacOwan writes in the *Agricultural Journal of Cape Colony* for April 30th:—"It is worthy of note that Australian salt-bush is now plentifully advertised in Californian papers as "the special forage plant for alkali" soils. The species offered is *Atriplex semibaccata*, a near relative of the valuable *A. nummularia* which has been spread far and wide up country by the enlightened and unpaid agency of Mr. Edward Alston. It will astonish our Californian friends to hear that the salt-bush was actually petitioned against in a certain brack district of Cape Colony, and the Government was asked to class it along with burweed for extirpation because it spread so fast."

Atriplex vesicaria, Howard.—A bushy shrub covered with scaly tomentum. Central and South-eastern Australia. According to Mueller "One of the most fattening and most relished of all the dwarf pastoral salt-bushes of Australia, holding out in the utmost extremes of drought, and not scorched even by sirocco-like blasts. Its vast abundance over extensive salt bush plains of the Australian interior to the exclusion of almost every other bush except *A. halimoides* indicates the facility with which this species disseminates itself. Splendid wool is produced in regions where *A. vesicaria* and *A. halimoides* almost monopolise the ground for enormous stretches. With other woody species it is also easily multiplied from cuttings, but, as remarked by Naudin, it produces thousands of fruits in less than three months after sowing, and as stated by Millardet it has become (of late years since its introduction) the marvel of the Delta of the Rhone, in the South of France." (Cultivated at Kew.)

Other Australian salt-bushes are species of *Kochia*. In these the leaves are narrow and fleshy, sometimes half round. The fruits are surmounted with the almost flat membranous calyx with a winged border. This character easily distinguishes the Kochias from other salt-bushes. There are two Australian species of *Kochia* specially valued for fodder purposes.

Kochia eriantha, F. v. Muell. A stout shrub with the branches covered with a woolly tomentum. Mueller says:—"Proved an excellent fodder herb for sheep on the hot and dry pastures of Central Australia, where the temperature in summer reaches 120° F. in the shade, and in the winter falls 27° F. (Rev. H. Kempe). Several other Australian species of *Kochia* afford excellent pasture fodder.

Professor W. A. Dixon found 65 per cent. of digestible substance in *K. pyramidata*."

Kochia villosa, Lindley. An under-shrub or shrub, erect, spreading, or decumbent, found in most of the depressed and saline regions of Australia particularly inland, also on sand lands. According to Mueller "renowned amongst occupiers of pasture runs as the 'cotton bush'; so called on account of the downy covering on the branches and leaves. This rather dwarf shrub resists the extremes of drought and heat of even the trying Central Australian climate. The roots sometimes penetrate into the ground to a depth of 18 feet (Lockhart-Morton). With all other pasture animals dromedaries like this and some other salt-bushes, particularly for food; so also ostriches. These plants can be readily multiplied from cuttings."

Of *Rhagodia parabolica*, R. Br., Turner writes (p. 48):—"This shrub is found in the interior of Queensland, New South Wales, and South Australia, and usually in or near moist places, but is nowhere very plentiful. It is probably one of the best known of all saltbushes by stockmen, and on account of its mealy-white appearance they have given it the common name of 'Old Man Saltbush.' At one time this shrub was a prominent feature in many places in the interior, but of late years it is gradually becoming more scarce."

DXXII.—OSIERS.

The basket-industry appears to have decayed of late in this country, though there are some signs of a revival. Osiers are consequently no longer cultivated to the same extent as formerly. Basket-making is one of the most ancient of native industries and baskets the most primitive of appliances. Yet for many commercial purposes they remain superior to the modern and more civilized packing case. Being less rigid they will stand rough usage with less injury to their contents, and their toughness and strength enables them to endure a vast amount of wear and tear.

The following extracts are taken from a paper issued by the Board of Agriculture in 1893 on the "Cultivation of Osiers."

"There are no official records of the quantity of osiers imported into this country, but it has been estimated that some thousands of tons are received from abroad annually. There is also said to be a large and increasing importation of baskets. The number of baskets required for the fruit industry alone is considerable, and it must increase with the extension of fruit cultivation. Formerly the fruit was generally packed in baskets made of red or unpeeled osiers, but white osier baskets are almost invariably used now (p. 1).

"There can be no doubt that the extent of osier holts in the Fen district is now much less than it was, but at the present moment there is some evidence of increased interest in the subject and greater attention to the business. The industry is apparently becoming more of a speciality, and basket makers are planting holts in some instances to supply their own requirements" (p. 3).

The following correspondence relates to a request from the Government of Madras for a supply of cuttings of the willows esteemed by

basket-makers to the Presidency. It brought to light the curious fact that very little is accurately known about them, and that information is not readily procurable.

INDIA OFFICE to ROYAL GARDENS, KEW.

India Office, Whitehall, S.W.,
19th December, 1893.

SIR,

I AM directed by the Secretary of State for India to forward herewith a copy of a letter, and its enclosure, received from the Government of Madras regarding cuttings of certain varieties of osiers and sallows required for planting in that Presidency, and to ask you to be so good as to give instructions for the cuttings to be procured, properly packed and forwarded to the District Forest Officer, Nilgiris, Ootacamund, Madras, by any route you may consider most safe and expeditious.

All costs that may be incurred will be paid by this office.

I am, &c.

The Director,
Royal Gardens, Kew.

(Signed) A. GODLEY.

[Enclosure.]

GOVERNMENT OF MADRAS to INDIA OFFICE.

Revenue Department, Fort St. George,
7th November, 1893.

SIR,

I AM directed to forward a copy of the proceedings of the Board of Revenue, Land Revenue, on the planting of osiers and sallows in the swamps of the Nilgiri District, and to request that the Right Honourable the Secretary of State will be pleased to arrange with the authorities at the Royal Botanical Gardens, Kew, for the transmission to the address of the District Forest Officer, Nilgiris, Ootacamund, of cuttings of the varieties referred to in the list attached to the collector's letter. The size of the cuttings, and a description of the manner in which they should be packed are given in the collector's letter.

I have, &c.

(Signed) R. GIBSON,

Acting Secretary to Government.

The Assistant
Under Secretary for India,
London.

ROYAL GARDENS, KEW, to INDIA OFFICE,

Royal Gardens, Kew,
7th February 1894.

SIR,

I HAVE the honour to acknowledge the receipt of your letter of December 19, asking that cuttings of certain specified varieties of osiers and sallows might be obtained for transmission to the District Forest Officer, Nilgiris, Ootacamund, Madras.

2. Compliance with this request has not been easy, as the cultivation of willows appears to be a decaying industry in this country, and considerable difficulty has been experienced in finding a person who would

supply cuttings of the particular kinds desired. These are known by merely technical names, which have not been identified botanically.

3. It has now, however, been accomplished, and a box containing 15 kinds of osiers has been this day despatched to the India Office. It should be forwarded to India with the greatest despatch, and instructions should be given that it should be placed in a cool part of the hold (but not in a cool chamber). Precautions should also be taken to prevent its being unduly delayed at the port of arrival.

I am, &c.

(Signed) W. T. THISELTON-DYER.

Sir Arthur Godley, K.C.B.,
India Office, Whitehall, S.W.

ROYAL GARDENS, KEW.

A list of osier cuttings sent in a close case, per India Office, to the District Forest Officer, Nilgiris, Ootacamund :—

No. on Label.			Trade Name of Osier.
1	-	-	Black Hollander.
2	-	-	Black Mauls.
3	-	-	Welsh Osier.
4	-	-	French Osier.
5	-	-	Glibskins.
6	-	-	Green Sucklings.
7	-	-	Jelstiver.
8	-	-	Mottled Spaniards.
9	-	-	Cane Osier.
10	-	-	Cardinal Osier.
11	-	-	Old Black, new kind.
12	-	-	Golden Osier = <i>Salix vitellina</i> .
13	-	-	Fine basket Osier = <i>S. forbyana</i> .
14	-	-	Green boxed = <i>S. rubra</i> .
15	-	-	Spaniard Rod = <i>S. triandra</i> .

Numbers 1 to 8 are used for best work in baskets, &c. Numbers 9 to 12 are used for rough work, such as baskets for fruit, potatoes, &c.

February 7, 1894.

DISTRICT FOREST OFFICER, NILGIRIS, to ROYAL GARDENS, KEW.

Nilgiri Collector's Office, "Forest Branch,"

DEAR SIR,

March 30th, 1894.

THE osier and sallow cuttings sent by you through the India Office, arrived here on the 21st instant in excellent order, and were at once planted out. The buds had all burst, and the cuttings were well rooted and healthy. I trust they will prove a success here.

I am, &c.

(Signed)

R. W. MORGAN.

W. T. Thiselton-Dyer, Esq., C.M.G., C.I.E.,
Director, Royal Gardens, Kew.

Besides the paper already referred to, issued by the Board of Agriculture, which contained valuable statistics and much information respecting methods of cultivation, &c., a paper on "The Cultivation of Osiers as a Means of Utilising Boggy Land," by W. J. Cochrane, Glen-side, Hetton-le-Hole, Fence Houses, Durham, was also published in 1893, in the "Transactions of the Highland and Agricultural Society of Scotland." In the latter, botanical names are given, and the statements in the following extract (p. 132) are definite enough:—

"If basket-work is the main use to which they are to be put, perhaps the best kind is the common white willow, *Salix alba*, which grows fast and attains a large size, yielding tannin and salicin, while, in addition to its utility for basket-making, its wood is suitable for wattles, fuel, and chip. The common willow, *Salix viminalis*, is a very good osier for general purposes, being suited alike to rough and to delicate work; while a taller variety, the long-leaved willow, *Salix triandra*, growing to a height of 20 feet, is one of the most useful of all willows. Amongst others I would mention *S. rubra* and *S. laurina*; whilst if the substance salicin, obtained from the bark and used for medicinal purposes, is wanted, the species *S. fragilis*, or the crackling willow, is to be recommended as being the richest in this substance, and at the same time yielding a fair amount of very good timber."

On the other hand, in the Board of Agriculture pamphlet technical names are used, and it would appear from correspondence on the subject, that these names are limited to certain districts. In order to determine botanically, the different osiers bearing these local names, cuttings of a dozen kinds, were obtained from Mr. R. Brown, Somersham, Hunts, a practical osier grower; these have now flowered, and have been definitely determined.

1. Glibskins -	-	-	<i>Salix triandra</i>	♀
2. Jelstiver -	-	-	" "	♀
3. Black Hollander -	-	-	" "	♂
4. French osier -	-	-	" "	♂
5. Old black, new kind	-	-	" "	♂
6. Green sucklings -	-	-	" "	♂
7. Black Mauls -	-	-	" "	♀
8. Cardinal willow -	-	-	<i>Salix alba</i> , var.	♀
9. Golden osier -	-	-	<i>Salix viminalis</i>	♂
10. Cane "	-	-	" "	♀
11. Welsh "	-	-	<i>Salix purpurea</i>	♂
12. Mottled Spaniards -	-	-	<i>Salix decipiens</i>	♀

(*S. decipiens* is very nearly allied to *S. fragilis* and is placed as a mere form under that species by many authorities; others regard it as a hybrid.)

According to Mr. Brown Nos. 1, 2, 3, 4, 6, 7, 11, 12, are the best for basket making (for the best class of work) while Nos. 5, 8, 9, and 10 are for rougher work such as gardening baskets (for potatoes, fruit, &c.).

DXXIII.—WILD COFFEE IN BRITISH CENTRAL AFRICA.

Sir Henry Johnston, K.C.B., Her Majesty's Commissioner in British Central Africa, published in the *British Central Africa Gazette* for October 15th last, the following account of a presumed wild coffee in

Nyasaland. The plant, however, on examination at Kew, proved to belong to a different tribe of Rubiaceæ to *Coffea*. It appeared to be a plant hitherto unknown and was described by Mr. Hemsley in the *Kew Bulletin* for January last (p. 18) as *Cremaspora coffeoides*. The genus comprises but a few species all confined to Africa and adjoining islands.

The Commissioner's account is subjoined :—

On his recent journey to the Mlanje district, Her Majesty's Commissioner made an interesting discovery. In the valley of the little Nyungwi stream, which flows direct into the Ruu about 10 miles west of the confluence of the Likubula and the Ruu, and close to the place where the Nyungwi is crossed by the main road to Fort Anderson, the Commissioner found growing a species of wild coffee apparently identical with that which is met with in the interior of Moçambique, on the Zambesi, and at Inhambane. By a happy chance this wild coffee was not only in blossom, but bore the ripe berries at the same time. In growth the tree was very straggling, and somewhat resembled the original cultivated coffee tree in the Blantyre Mission grounds. This wild coffee was found growing for several hundred yards along the banks of the stream. The Commissioner collected a large number of the berries, some of which were ripe, and these will be planted in the gardens at Zomba. Specimens were also collected of the leaves, flowers and fruit for transmission to Kew for identification.

It has generally been stated by the Commissioner himself amongst others, that there is no wild coffee indigenous to Nyasaland, and certainly up to the present discovery it was believed that no specimens of the wild coffee had been found by anyone. The Commissioner searched diligently in almost all the other stream valleys that he crossed in the Mlanje district for other specimens of the wild coffee, but was not able to find any.

It is just possible that these trees found on the Nyungwi stream close to the Portuguese border might have had their origin in seeds of the wild Zambezi coffee accidentally conveyed there. At the same time, seeing that coffee is indigenous to tropical Africa, and is found in almost all the warm parts of the continent which are not absolute deserts, it is very extraordinary that a fertile region like Nyasaland should almost alone possess no form of indigenous coffee. The Commissioner therefore desires us to publish this discovery for the information of planters and others who, by careful investigations, may succeed in discovering a wild indigenous coffee in the British Protectorate. Meantime he has no objection to the berries of the wild coffee growing on the Nyungwi stream (which is on Crown land) being gathered by any persons who may like to try the experiment of planting this wild coffee.

DXXIV.—SOUTH NYASALAND.

The British Central African Gazette for December 15 last, gives under the title of Zarafi's country, the following interesting account of a recently opened district in South Nyasaland :—

This may be defined as a triple range of hills running in a north-easterly direction from the middle of Lake Chilwa to the south-east gulf of Lake Nyasa. There is first a low range of foothills commencing about 20 miles to the north of Lake Chilwa and running nearly parallel

with the shore of Lake Malombe; then a great hog's-back culminating in Mangoche Mountain and the Castellated Hills, and to the east of the main range a broken series of more or less high mountains (Usui, Lisamba, Unangu, Lipelele). Further to the east are many isolated mountains in Portuguese territory dotting the Lujenda plain.

Until the recent expedition, no European had ever set foot in Zarafi's country proper, that is to say, on Mount Mangoche, which is a long range about 14 miles in length, including the Castellated Hills, and four miles broad: not of course, quite isolated, but connected with other ranges, north and south, by outlying spurs. The culminating point of Mangoche is approximately, 5,500 feet above the level of the sea, or about 4,000 feet above the level of Lake Nyasa. To the north of the highest point of Mangoche the mountain slopes rather abruptly to a pass about 1,200 feet below, which is a flattened ridge sloping with undulations into the Lujenda valley on the one side and more abruptly on the other into the Malombe plain. In the centre of this flattened ridge, which is a veritable gate into Central Africa from the east coast, is built Zarafi's town. At the northern end of this remarkable pass rise the two Castellated Hills—extraordinary pyramids of tremendous rounded rocks or boulders, nearly equal in height to Mangoche Mountain. Between these Castellated Hills a steep pass descends to the north-west into a lovely fertile valley through which a road leads over the western range of foot-hills down to the Upper Shire and Lake Nyasa. From the summit of Mangoche Mountain looking down over the pass whereon Zarafi's town is built, north-west from the two Castellated Hills, the arrangement of the mountains bears a fantastic resemblance on a gigantic scale to the head of some colossal extinct two-horned rhinoceros (such as there were in times past), which bore the horns transversely on the end of the nose and not longitudinally as do the existing species. The crest of Mangoche would be the crest of the animal's skull, the flattened pass in which Zarafi's town is built the curious depressed frontal bones of the rhinoceros, and the two Castellated Hills the transverse horns on the end on the snout.

There is probably no place in the Protectorate built on such an almost impregnable site, and with such commanding views as Zarafi's. Although flat and pleasant for walking on the summit of the pass, the ascents on the east, west, and north are abrupt and narrowed into gorges which a few resolute men could easily block. On the south is the crest of Mangoche Mountain, from which the place could be easily shelled by European artillery, but which would offer no advantage to savage warriors, as Zarafi's town would be quite beyond range from these heights. Another feature which adds to the impregnability of this natural fortress is the ample water supply. Not only do four streams take their rise within a circuit of a mile and a-half of Zarafi's town, but two of these streams rise from springs actually at the top of the pass in the centre of the town, and one of them affords pure cold drinking water, whilst the other is suitable for washing purposes, though it, too, could be made perfectly drinkable by protecting the source from defilement. In the first valley to the east of Zarafi's town and about 100 feet below is a beautiful rushing stream full of water, even at the very end of the dry season. The pass has, however, been greatly denuded of trees—not, we think, because of any action of the wind, but simply by the usual vandalism of the Yaos. Such trees as remain in or near the town grow well—in fact, one of these trees at the end of the town is a landmark for miles, and can be easily seen from Fort Johnston, 20 miles away. If the town is replanted extensively with shady trees the only

disadvantage at present existing will be removed, viz., its wind-swept condition, and the glare in bright sunshine caused by the want of shade. Both this pass and the surrounding mountains are strewn with boulders in the most extraordinary manner, and all of them rounded and not jagged. Some of these stones are gigantic monoliths set on end like Stonehenges, others are mighty recumbent rounded masses of stone. Between the boulders the soil is very fertile, and where it does not grow food crops it is covered with short grass or luxuriant herbage and wild flowers. All the other parts of Mangoche Mountain are clothed with dense forest, many of the trees being of fine growth. Below this forest are strips of greensward and below this again the mountain side is strewn with gigantic boulders as though they had been scattered by some giant's hands. Mangoche Mountain—indeed, the whole Mangoche range—is a regular sponge as regards issuing streams and fountains; and this, too, at the very end of the dry season. The scenery is beautiful, and the views from Zarafi's pass are most comprehensive. From here the eye ranges over the valley of the Lujenda river, and on a clear day the narrow slit-like lake of Chiuta can be descried (this lake really looks like a very long broad river). Turning to the south-east, one can see the ranges of Zomba and Chikala (round the side of Mangoche), the Upper Shire from near Mpimbi to its entrances into Lake Nyasa (the broad sweep of water in Lake Malombe is most effective—like a great silver crescent set in a blue plain), and, looking to the north-west, the whole of the south-eastern shore of Lake Nyasa up to Cape Maclear can be followed. Due west on a clear day, the mighty Angoni plateau, rising to 7,000 feet and perhaps higher, looms like some distant land suspended in the heavens. For a watchful robber chief there could be no finer site chosen, for, except in very hazy weather, all roads leading from the plains up to his pass could be watched. On a clear day the houses at Fort Johnston can be easily made out together with the gunboats at the south end of the lake or the river side. As the crow flies it is possible that Fort Johnston is not more than 18 or 19 miles distant, though by the road it is at least 24.

The altitude of Zarafi's town is about 4,250 feet above the sea or 2,750 feet above the level of the Upper Shire. It is consequently a very cool place at night time and probably in the winter season would be distinctly cold. It ought to be healthy, except for the high winds, and it is certainly swept by all the winds of heaven though down below in the gorges there are plenty of sheltered places protected from these unwelcome breezes. For a European settlement we should think that the western flanks of Mangoche Mountain might be preferable to the eastern, as less exposed to the wind. Here there are thousands of acres of virgin soil on the skirts of the fine forest, with an abundant water supply, and at average altitudes of 4,000 feet above the sea.

If only for scenery this portion of the South Nyasa District deserves a visit. It is now perfectly safe to travel to Mangoche, and Captain Cavendish, who is in command of Zarafi's town, would be happy to receive visitors and show them the wonders of the place. To those fond of picturesque scenery we would recommend the path which skirts the western side of Mangoche Mountain. The scenery, on a much larger scale, resembles "The Valley of the Rocks" at Lynton on the North Devon coast. The path keeps pretty much on a level and is easy walking. Above towers the forest-crested ridge of Mangoche, and below, the eye ranges over remarkable rocky spurs, green gorges, and this extraordinary jumble of boulders, some standing on end, some prone, which we have already sought to describe.

DXXV.—MISCELLANEOUS NOTES.

MR. CHARLES BERRYMAN, a member of the gardening staff at Kew, has been appointed Acting-Curator of the Botanic Station at Aburi, on the Gold Coast, during the absence on leave of Mr. C. H. Humphries, the curator. Mr. Berryman left Liverpool for West Africa on the 13th June last.

MR. JOHN HENRY HOLLAND, a member of the gardening staff of the Royal Gardens, has been appointed, on the recommendation of Kew, by the Secretary of State for Foreign Affairs, Assistant Curator of the Botanic Station at Duke Town, in the Niger Coast Protectorate. He left Liverpool for Old Calabar in the middle of June last.

MR. WILLIAM BERNICE FRENCH, a member of the gardening staff at the Royal Gardens, has been appointed assistant at the Municipal Gardens at Queenstown, South Africa. Mr. French had been a sub-foreman in the orchid-houses and the Palm-house for the last three years. He entered Kew in August, 1891, and had previously served in the garden of the late Sir George Macleay, at Bletchingley. He left for South Africa in June last.

MR. HENRY MILLEN, the curator of the Botanic Station at Lagos, has arrived at home on leave of absence. He has been in the service of the Lagos Government since 1890. During his absence the duties at Ebute Metta will be discharged by Mr. F. G. R. Leigh, acting curator, while Mr. T. B. Dawodu will be in charge of the Gardens attached to Government House. Messrs. Leigh and Dawodu are both natives of Lagos and received horticultural training at the Botanical Gardens, Jamaica (1890-93) and afterwards at Kew (1893-94).

It will be a matter of deep regret not merely to the Government of the colony, which he has served so well, but also to the botanical world, that Dr. TRIMEN was obliged, owing to serious ill-health, to retire on July 1 last from the post of Director of the Royal Botanic Gardens, Peradeniya, in Ceylon. Dr. Trimen, who was at the time second officer in the Botanical Department of the British Museum, was appointed on the recommendation of Kew to succeed the late Dr. Thwaites in 1879. His administration of Peradeniya, whether from a practical or a scientific point of view, has brought it into the front rank of the great botanical establishments of the world. On this point the following extract may be quoted from an article by Dr. Treub, the Director of the Great Botanic Garden of the Dutch Government at Buitenzorg in Java. This article, originally published in the *Revue des Deux Mondes* for January last, has been translated in the *Smithsonian Report* issued from Washington.

EXTRACT from "A Tropical Botanic Garden," by Dr. Treub, in *Smithsonian Report* for 1890, p. 390.

"The Royal garden of Peradeniya, in the island of Ceylon, was founded in 1821. Situated near Kandy, at an altitude of nearly 500 metres [1,600 feet], having a moist and hot climate, occupying more than 60 hectares [150 acres], and connected as it is with the port of Colombo by a railway, the garden of Peradeniya possesses conditions most

favourable in every respect. For many years it was under the direction of Dr. Thwaites, a man of real merit, but who thought a botanic garden in a tropical country should be in some manner a reduced copy of the virgin forest. This system, more original than meritorious, excludes any methodical arrangement of plants and necessarily restricts the number of specimens. Dr. H. Trimen, the successor of Dr. Thwaites, as soon as he arrived in Ceylon, realised the disadvantages of the plan of his predecessor. To distribute over an area of 60 hectares, without any order, a great number of plants, for the most part not labelled, was to fatally embarrass the scientific use of the rich collections that had been brought together. So Dr. Trimen did not hesitate to adopt a new arrangement of plants according to the natural system, and to label them as far as it was possible to do so. With branch establishments upon the plain and upon the mountain, the garden of Peradeniya has before it a brilliant future.

Dr. Trimen has not merely carried out a most efficient and thorough reorganisation of his department, but he has signalised his term of office by the production of three volumes accompanied by an atlas of plates of the long-desired *Handbook of the Flora of Ceylon*. (For notices of these volumes, reference may be made to the *Kew Bulletin* for 1894, pp. 34 and 227, and 1895, p. 236.) A final volume alone remains to complete this invaluable work. It is satisfactory to record that Dr. Trimen has been "given by the unanimous vote of the Legislative Council a special allowance in addition to his pension for the last six months of the year in order to complete the scientific work upon which he is now engaged."

As one of the founders of the colony of British Central Africa; as a most successful pioneer in its agricultural development and as an active promoter of the botanical investigations of its flora, JOHN BUCHANAN, C.M.G., who died on his way home on March 9th, deserves a record. He first went to Africa in 1876, in the service of the Church of Scotland Mission, and soon, without any practical knowledge, became a planter of coffee, sugar, and tobacco, and in building up a large and successful business for himself he assured the future of the colony in industrial enterprise. A reference to Sir Henry Johnston's report on this subject, reprinted in the *Kew Bulletin*, 1895, p. 190, will give some idea of the extent of his operations. Like many busy men, he found time to do many things. In 1892 he transmitted a large collection of dried plants to Kew. It comprised about 1,500 numbers; most of them being represented by several specimens. Sets of this collection were distributed to eight of the principal herbaria of the world. Many of the novelties have been published in the *Kew Bulletin*, and in *Hooker's Icones Plantarum*, and many still remain undescribed.

Although not one of the pioneers in British Central Africa, ALEXANDER CARSON laboured hard and successfully in developing the resources of the colony; and he, like Buchanan, contributed largely to our knowledge of its vegetation. From time to time he sent dried plants to Kew through Mr. R. Kidston, of Stirling. Altogether these formed a large collection, including numerous novelties, many of which have been published in former volumes of the *Bulletin*,

notably in 1895, pp. 63-75 and 288-293. A few have also appeared in *Hooker's Icones Plantarum*.

The following particulars of his career were furnished by his brother, Mr. Thomas Carson :—

Alexander Carson was born at Stirling, N.B., in the year 1850, and was educated at the High School there. Following his natural bent he served an apprenticeship in one of the Clyde Marine Engineering Works, and thereafter sailed as engineer on one of the Cunard Company's Mediterranean steamers. Being of a studious disposition, the routine duties of a ship engineer soon became distasteful to him, and having resigned his situation he entered Glasgow University with the view of qualifying himself for better work. Having taken the degree of B.Sc. in 1883, he was for some time employed in Glasgow engineering offices. In 1886 he accepted an appointment under the London Missionary Society for service at Lake Tanganyika. Having fitted up the engines of the steamer "Good News," and having seen this, the first steamer on the lake, fairly at work, the immediate object of his appointment was accomplished. His time was now devoted to teaching the natives the various industries, which his education qualified him to do, work in iron (in which the country abounds) being foremost. He also took an active part in educational work.

In 1888 the Arabs of Ujiji menaced the lives of the missionaries on the lake shore, and access to the coast being cut off both by the Zanzibar and Nyasa routes all communications with and supplies from home were stopped for over a year. After five years' work he enjoyed the customary twelve months' furlough, resuming his work in 1892. The scene of his work was now at Fwambo, a native village some 50 miles south of Lake Tanganyika, some thousands of feet above sea-level. Under his management much improvement has been made in the physical condition of this village; industry has been fostered, the general habits of the people have been improved, and many hundreds of the young have received the rudiments of education, while religious teaching has not been neglected.

For many years his health was fairly good; last year, however, an attack of hæmaturic fever proved nearly fatal, but recovering, he was able to resume his work for another year. Then came a second and a third attack of the same disease, under which he sank from sheer weakness on February 28 of the present year.

Botanical Magazine for June.—The plants figured are: *Agave laxifolia*, *Habenaria Elwesii*, *Phajus mishmensis*, *Eranthemum reticulatum*, and *Episcia densa*; all, except the *Habenaria*, from plants grown at Kew. The *Agave* has been cultivated here for many years, and flowered for the first time in 1895. It is a native of Mexico. *Habenaria Elwesii*, native of the Nilghiri Hills, was communicated by H. J. Elwes, Esq., F.L.S., in whose garden it flowered in July 1895. The *Phajus* figured is a native of the Eastern Himalaya, and was discovered by William Griffith in 1836. The Kew plant was presented by the Right Hon. the Earl of Seabrough, who collected it himself. *Eranthemum reticulatum*, a fine ornamental plant, has been long in cultivation. It is probably a native of the Melanesian Islands. *Episcia densa*, native of Demerara, was sent to Kew by Mr. Jenman, Government Botanist and Superintendent of the Botanical Gardens of Georgetown, British Guiana.

Botanical Magazine for July.—All the drawings were made from plants in cultivation at Kew. They are: *Lourya campanulata*, *Pilocarpus Jaborandi*, *Aspidistra typica*, *Akebia lobata*, and *Hæmaria dawsoniana*. The *Lourya* is a curious plant, native of Cochin China, with the habit of *Curculigo* and *Peliosanthes*. The subject of the figure was obtained from a French nursery in 1892. *Pilocarpus Jaborandi*, native of Pernambuco, was received from the Cambridge Botanic Garden, and flowered at Kew in January of this year. The plant is interesting on account of its powerful medicinal properties. The *Aspidistra* is a native of Tonkin. The plant from which the drawing has been made was obtained from the Jardin des Plantes, Paris, in 1895. *Akebia lobata*, native of China and Japan, flowered in the greenhouse at Kew in January of the present year. The *Hæmaria*, a native of Burma, was communicated to Kew from the Royal Botanic Garden, Calcutta.

Hooker's *Icones Plantarum*.—The concluding part of the fifth volume of the fourth series appeared in July. It consists of plates 2476 to 2500 of the entire work, and the first nine plates are devoted to the illustration of West Tropical African species of *Amomum*, chiefly collected by Mr. Gustav Mann, between 1859 and 1862. *Trachymene cecelia* is a handsome species of this essentially Australian genus from the Celebes. It is most nearly allied to *T. saniculæfolia*, a native of Mount Kinabalu, North Borneo. Two tuberous-rooted species of *Plectranthus* are figured. They are natives of Natal, where several other species of this section grow, and where their tubers are esteemed as food by the Kaffir inhabitants. *Stenolirion* (Amaryllideæ); *Garnotiella* (Gramineæ); and *Batesanthus* (Asclepiadeæ) are new genera: the first and last tropical African, and the grass from the Philippine Islands.

Flora of British India.—A note in the *Kew Bulletin* for 1894 (p. 225) records the fact that the elaboration of the difficult order of grasses only remained to complete the enormous labour undertaken by Sir Joseph Hooker in preparing the *Flora of British India*. This, the crown of the edifice, was perhaps of all the most difficult of achievement. The publication of a first part of Volume VII., which contains the whole of the *Panicaceæ*, will be hailed therefore by all botanists with as much satisfaction as admiration.

The following extract from Sir Joseph Hooker's brief introduction to the order gives some idea of the difficulties with which he had to contend. They are probably unique in any part of the vegetable kingdom, at any rate as far as flowering plants are concerned:—

“In working up the grasses for this Flora, I find the multiplication of species to have passed all bounds, and their nomenclature to be involved in a corresponding degree. This has arisen from two principal causes, from authors not taking into account the wide area over which the individual species of grasses range, and from the imperfection of the descriptions of the earlier and many later authors. It is sixty-two years since Kunth published his “*Agræstographia Synoptica*” (Tubingen, 1833); which is an uncritical sweeping up of all previously known supposed genera and species, with imperfect descriptions and synonyms. It was succeeded (in 1835) by a second volume, in which a few hundred species of the first volume are very fully and accurately described, and valuable notes upon others are added. In 1855 Steudel's “*Synopsis*

Graminum" appeared. It in no respect advances, and in many ways retards, the student of the Order. Of more recent works on *Gramineæ* three only are of great mark, namely, Munro's very able monograph of the *Bambuseæ* (Trans. Linn. Soc., vol. xxvi., 1868); Bentham's revision of the genera; Gen. Plant., vol. iii. (1883), a work of remarkable completeness and accuracy, considering the chaotic condition in which the author found the Order; and Hackel's admirable monograph of the *Andropogoneæ* in A. de Candolle "Monogr. Phanerog." vol. vi. (1889), the largest and most difficult tribe of grasses."

It is doubtful if any living botanist could have brought to the task the extraordinary power which Sir Joseph Hooker possesses of dealing with an immense mass of confused and complicated detail and of arriving at clear and definite conclusions from them. To Dr. Stapf, a member of the Kew staff, the duty was assigned of assisting Sir Joseph Hooker in the more laborious portion of his task. To the efficient aid which he rendered Sir Joseph Hooker pays a compliment as charming as it is deserved.

Distribution of Alpine Plants.—The Linnean Society has published in its *Transactions* the elaborate tables showing "The Distribution of Plants on the south side of the Alps" prepared by the late John Ball, F.R.S., Under Secretary of State for the Colonies from 1855-7. The work of preparing them for and passing them through the press has been done at Kew. The following extracts from the "Introductory Note" contributed by the Director will show the nature of the task which Mr. Ball set himself. The result cannot fail to be of the greatest service for the study of the problems presented by the Alpine Flora, which are amongst the most interesting of those presented by the vegetation of any part of the earth's surface:—

The late Mr. John Ball, F.R.S., as is well known, devoted a considerable portion of a very varied life to the minute study, both topographical and scientific, of the European Alps. The results of the former were embodied in a book, which, in its way, will, I suppose, always remain a classic, the well-known "Alpine Guide." Those of the latter he never published in a comprehensive form, though he drew from time to time for occasional papers upon the records which he had patiently accumulated for a period of about 30 years.

Mr. Ball died on October 21, 1889, somewhat unexpectedly, after a brief illness. Some time afterwards his widow placed in my hands his botanical papers in the hope that I might be able to extract from them something of permanent value which would record his long and patient labours upon the Alpine flora. The task was no easy one, and I think I should have shrunk from it without the encouragement of Mr. G. C. Churchill, the best surviving authority in the country on the subject, and of Mr. J. G. Baker, F.R.S., the Keeper of the Kew Herbarium. As the result, I found that practically the whole of Mr. Ball's work on the flora of the Alps is concentrated in the elaborate Table of the Distribution of Plants on the South Side of the Alps which is now submitted to the Society.

The precise nature of the task which Mr. Ball set himself, is described in a lecture "On the Origin of the Flora of the European Alps," which he delivered before the Royal Geographical Society on June 9, 1879. It will be best given in his own words:—

"More than 20 years ago I began to tabulate the plants of the Alps, so as to show the distribution of each species within the range of the

Alps and on the other mountains of Europe. As the southern side of the main chain has the richest and most varied flora, and was at that time the less fully known, I divided it into 50 districts, and set myself to collect materials from published works, from public and private herbaria, and mainly from my own repeated visits—this part of my work involving, in fact, the preparation of 50 local floras. Though I regard the work of botanical exploration as yet far from complete, I in this way accumulated a great mass of materials, and the question then arose as to what conclusions should be drawn from them." (Proc. R. Geogr. Soc., 1879, p. 565.)

It will be seen that what Mr. Ball accomplished, and, so far as it is possible to judge, in a tolerably exhaustive manner, is to work out the detailed distribution of the Alpine flora for 50 easily recognisable districts on the same principle as that adopted with such conspicuous success by Mr. H. C. Watson for the flora of Great Britain in his well-known "Cybele Britannica."

I learn that during the last few years of Mr. Ball's life, partly from failing eyesight, partly from other causes, he had worked but little at the table, though he always regarded it as of great importance. I do not know that this materially diminishes its value. It is obvious that no work of the kind can ever be absolutely final.

Pictorial Aspect of Kew.—The fine series of views of the Lake in the Kew Arboretum and its vicinity, the work of M. and Mme. de L'Aubinière, were referred to in the *Kew Bulletin* for last year (p. 303) when a selection from them was placed on exhibition in the North Gallery. The talented artists have now had 24 of the most characteristic engraved by Count Ostrorog, and published in a volume entitled "The Poetry of Kew Gardens," of which Her Majesty the Queen has been pleased to accept the first copy. At their request the Director furnished the following preface:—

"Visitors to Kew who admire its stately trees, its sylvan glades, and its spacious lawns, probably in most cases suppose that Nature endowed it with its charms. But this is far from being the case. Kew throughout is the creation of the art of the gardener applied continuously for a century and a half, and never even at the present day ceasing to modify, develope, and refine.

"Landscape gardening, as exemplified in such a domain as Kew, is peculiarly English. It originated, no doubt, partly in an intelligent appreciation of the possibilities afforded by the climate, which allows smooth turf to grow in a manner unknown in other countries, partly in the demand for giving to country mansions harmonious and sympathetic surroundings. Its evolution has been gradual, and it is not without interest to notice that Kew has been the scene of the earliest attempts of its successive masters.

"English gardens down to the end of the sixteenth century were ordinarily walled enclosures laid out with extreme formality. They were adjuncts to the dwelling-house, and shared its defensive protection against disorder. The gardener stayed his hands at the limits of his boundary.

"Though in the next century walls gave way to hedges, the treatment of the garden still remained formal. The stately methods of the great French landscape gardeners were bodily transported to England at the Restoration. They were, it may be admitted, well suited to

splendid pageantry and a grandiose mode of life. But they were only adapted to large domains, as they sought to bring the surrounding park into connection with the garden by the plantation of extended avenues. This extension was the germ of landscape gardening proper. But the defect of the system was that its interest was almost exhausted at a first impression and its monotony soon became wearisome.

"The beginning of the eighteenth century saw a violent reaction against the formal style. This was largely due to the influence of Pope and Addison. Switzer was the first to introduce 'rural gardening.' The object was to connect the garden with its natural surroundings without the stiff and costly methods of Le Nôtre.

"Bridgeman at about the same time went even further. In the Royal Garden at Richmond (now incorporated with Kew) he 'dared to introduce cultivated fields, and even morsels of a forest appearance.'

"Kew, as it exists to-day, was formed by the fusion of two distinct properties or domains, both royal, but with entirely different histories. They corresponded roughly to the west and east halves of the present gardens. The western half was known as Richmond Gardens (or the Royal Garden at Richmond). The eastern half corresponds in great part to the grounds of Kew House, and to this the name of Kew Gardens was originally confined. The two properties were separated by Love Lane, the ancient bridle-road between Richmond and Brentford ferry. This was shut up and the two properties thrown together in 1802.

"Frederick, Prince of Wales, the father of George III., obtained in 1730 a long lease of Kew House. Sir William Chambers, who erected the Pagoda, the Orangery (now Museum No. III.), and other buildings, many of which have not survived, gives a description of the eastern half of the gardens in the middle of the last century.

"'The gardens of Kew are not very large, nor is their situation by any means advantageous, as it is low and commands no prospects. Originally the ground was one continued dead flat, the soil was in general barren, and without either wood or water. With so many disadvantages, it was not easy to produce anything tolerable in gardening; but princely munificence, guided by a director equally skilled in cultivating the earth and in the polite arts, overcame all difficulties. What was once a desert is now an Eden.'

"The task could not have been easy. But there seems reason to believe that in the main features which still survive it was the work of Kent, who has been termed the 'founder of the school of landscape gardening.' By the introduction of the sunk fence or ha-ha (largely used at Kew) instead of walls or fences, he brought external scenery into his landscape effects.

"An even more celebrated practitioner of the art, 'Capability Brown,' was employed by the Dowager Princess of Wales to remodel the western half of the gardens. A pretty clean sweep was made of the 'rural gardening' of Bridgeman. Brown's entire plan, which included the erection of a new palace, was never carried out. But Kew probably owes to him the beautiful Hollow Walk, now devoted to rhododendrons, which according to local tradition was made about the middle of the last century by the Staffordshire militia while quartered at Kew.

"For the greater part of a century after this Kew remained comparatively untouched. After the accession of Her Majesty to the throne it was determined to devote it to the purposes of a national botanic garden.

"Sir William Hooker was appointed the first director, and assumed office on the 1st of April 1841. The part then opened to the public was

only the original Botanic Gardens of about 15 acres. The remainder had lapsed into the condition of a wilderness, and was used as a game preserve by the late King of Hanover.

"By slow degrees the ground accessible to the public was increased, and in 1850 the whole of the 'pleasure grounds' were thrown open. Sir William Hooker found himself in charge of a spacious area, in many parts thickly wooded and overgrown, but devoid mostly of distinctive features or picturesque effects. The problem which he and his successors have had to face was how to treat this so as to convert it into a beautiful garden after the English plan, and yet utilise it for the scientific purposes to which it had been devoted.

"The plan adopted was that which has been customary in the treatment of great domains in this country in more recent times. It combines something of the more ancient practice with a free employment of that which succeeded it. The formal treatment which is still needed to harmonise gardening with architectural effects blends insensibly with the naturalistic which is most appropriate at a distance. Formality has neither been carried into the landscape with *Le Nôtre* nor banished altogether with Kent and Brown. When large buildings—the Great Palm House, the Winter Garden, the New Museum, and the Water Tower—were erected for the new purposes to which Kew had been devoted, the ground immediately adjacent to them was laid out under the advice of Nesfield in a strictly formal and stately way. To him are also due the long vistas which stretch away into the pleasure grounds, now the Arboretum. The more distant portions have been gradually remodelled, the aim being to weave the various collections of trees and shrubs into a whole which should avoid an artificial, and yet yield an agreeable effect, while still subserving a definite purpose. It can hardly be doubted that the result has been successful, and that it is possible to construct a great botanic garden which shall sacrifice nothing to its object, and yet be neither arid nor ugly.

"The lake at the southern end of the Royal Gardens, like every other picturesque feature which they contain, is of entirely artificial origin. It is difficult perhaps now to realize that the ground it occupies was once as flat as the rest. The lake was commenced about 40 years ago by Sir William Hooker, who had nothing more than an old gravel pit to work upon. It was further developed by Sir Joseph Hooker, and no pains have since been spared to improve its scenic beauty.

"I believe it was by accident that its pictorial merits attracted the attention of M. and Mme. de L'Aubinière. At any rate they have devoted two years to the work of depicting its varying aspects, and a collection of their studies is exhibited in a room at the North Gallery.

"A selection from these studies has now been reproduced in the present volume. I gladly accede to their wish that I should write these introductory words. I am glad that the charms of Kew should be made more widely known by their skilful pencils. But I am still more glad that the man of science and the artist should have been found to be able to join hands in a common work. It is, I confess, an unexpected result. But the explanation is not far to seek. Nature in all her aspects and moods has her own beauty, but that beauty is not always, is indeed seldom, pictorial. A direct transcript from nature, as in a photograph, seldom forms a picture. The artist then requires to select, to suppress, to find an agreeable composition. It is for this reason that a purely artificial landscape such as the Kew lake affords is more suitable to his purpose than one which is simply spontaneous. The result of successful landscape gardening may seem unstudied and artless, but this is far

from being the actual fact. Some part of the artist's work is already done to his hand; the composition is determined; what is coarsely rampant has been restrained; what is awkward or needlessly obstructive has been suppressed. But when the art of the gardener has done his share Nature still puts her glorifying touch upon the whole."

Hyoscyamus muticus.—Rear-Admiral Blomfield, Port House, Alexandria, sends (December 31st 1895) the following interesting note:—

We have lately lost (he died on December 9th) Dr. Sickenberger, a very valued old friend of mine and most kind-hearted and modest; he was an excellent botanist. He was a victim to overwork in connection with analyses of poisoning cases which he had undertaken for the Tribunal when he ought to have been having a complete rest in Europe.

In connection with his work, I may mention that this summer I observed a native gathering seeds from a large plant near some houses at Mex, five miles west of this, which I found to be *Hyoscyamus muticus*. The plant was three or four yards in circumference and was in full flower, with its handsome purple blossoms, as well as in fruit. I remembered having seen it in plenty in the valleys near Helouan, south of Cairo, but never before here, and sent a specimen to Dr. Sickenberger, who told me in reply that he had just established *four* cases of family poisoning (*not accident*) by the same seeds.

The natives call the plant "sagrân," which means "drunken" with reference to its properties, a name which at Mex is given to the *Hyoscyamus albus*, which is common there and used medicinally by the natives. How this one plant (the only one known) of *H. muticus* came to existence at Mex no one knows. I will send you a sample.

Chamædorea Pringlei.—This species was described by the late Dr. Sereno Watson in the *Proceedings of the American Academy*, xxvi. p. 157, from specimens obtained from the Tamasopo Cañon, San Luis Potosi, Mexico, said to be the most northern locality for any species of this genus. At that time the female inflorescence was unknown. A plant in cultivation at Kew has now produced female flowers. It has a creeping rhizome about 4 in. long and 1½ in. thick, and near its apex bears a crown of four leaves, each about 2 ft. long with 13 pairs of pinnæ, 8 in. long and 1 in. wide, acute at the apex and slightly constricted, especially on the lower side, at the base. The spadix arises from outside the base of the crown of leaves and attains a length of 18 inches and a diameter of two lines, and bears several distant, brownish, membranous, acute sheaths; at the apex it is somewhat thickened and has a single lateral branch. The flowers are globose, about one line in diameter and not immersed in the spadix. The calyx is deeply 3-partite, with rounded lobes conspicuously edged with dark brown. The petals are rather larger than the sepals, orbicular, concave, and occasionally with a brown spot at the apex. The six short staminodes are compressed and white. The ovary is globose, three-celled and with a single ovule attached to the inner angle of each cell. The stigma is short and 3-lobed. The fruit, which has been received from Mr. C. G. Pringle, is oblong and 4–5 lines long. The spermoderm is grey, minutely warted and sparingly reticulated. This species belongs to the section *Chamædoropsis*.

Juglans jamaicensis.—In the *Kew Bulletin* for 1894 (p. 138 and p. 371), are two paragraphs on the Jamaica Walnut, which is still imperfectly known at Kew. Some drift fruits, referred to in the *Botany of the Challenger Expedition* (i. pt. 3, p. 303), which were overlooked at the time, have recently come to light again. They formed part of a collection of stranded seeds and fruits from Palisadoes Plantation, Jamaica, made by Dr. D. Morris. The endocarp of these fruits is exactly like that represented in Descourtilz (*Flore Pittoresque et Médicale des Antilles*, vii. t. 453), in being exceedingly thick and in having a pointed apex. Whether it had floated down one of the rivers of Jamaica itself to be cast ashore again, or had its origin in one of the neighbouring islands, is uncertain; but hitherto Kew has not succeeded in getting specimens of any walnut-tree growing in Jamaica.

The Tapang Tree.—One of the most conspicuous trees in the State of Sarawak, Borneo, bears a name variously spelled “tapang,” “tapan,” and “tappan.” Mr. (now Sir Hugh) Low, in his book on *Sarawak, its Inhabitants and Productions* (1848), pp. 45 and 314, gives some particulars of its extraordinary dimensions and the fact of its elevated crown being a favourite place with bees for storing their wax. He did not succeed in getting specimens of its flowers or fruit, always a most difficult task; but he guessed it might be a species of *Ficus*. There is a representation of it in the North Gallery (No. 530); and in the catalogue it is referred to as being probably a member of the Dipterocarpeæ. Kew having been applied to for the botanical name of this remarkable tree, further researches have been made with the result that it is discovered to have been described long ago by the well-known traveller and botanist, Dr. O. Beccari; but the connection between the vernacular and scientific names had been overlooked. Dr. Beccari, *Malesia* (1878), p. 169, described it under the name of *Abauria excelsa*, so far as leaves and flowers are concerned, but he had no fruit. Previously, however (in 1873), a Malacca tree, *Koompassia malaccensis*, Maing., had been published in *Hooker's Icones Plantarum*, t. 1164. Suspecting the generic identity of *Abauria* and *Koompassia*, Mr. P. Taubert, of Berlin, communicated with Dr. Stapf, of Kew, who was able to verify the fact. Whereupon Taubert published (*Berichte der deutschen botanischen Gesellschaft*, x. p. 640, t. 32), the results of their joint investigations. He distinguishes three species of *Koompassia*, namely, *K. excelsa*, (*Abauria excelsa*), *K. malaccensis*, and *K. beccariana*; but the copious material at Kew points to the specific identity of the two last.

All travellers agree in describing the *Tapang* as a magnificent tree from 250 to 300 feet high, having a smooth, straight, cylindrical trunk without a branch up to 100 to 150 feet. Yet the flowers of this tree are so minute, about an eighth of an inch in diameter, as to have given rise to the belief among the natives that it bears none. It is a member of the Cæsalpineæ, having pinnate leaves about an inch long, and a thin, oblong, almost papery, one-seeded pod, four or five inches in length.

Koompassia malaccensis, the *Kumpas*, or *Koompass*, of Malacca, is also a handsome tree of gigantic size.